AMENDMENTS TO THE CLAIMS:

Kindly amend claims 2, 3,6, 15, 17, 58, 63-65, 68, and 70, as shown below.

This listing of claims will replace all prior versions and listings of claims in the Application:

Claim 1 (cancelled).

Claim 2 (currently amended): The pump of Claim 63 wherein the actuator housing comprises two or more chambers for housing the ~~fluid~~liquid in flow connection.

Claim 3 (currently amended): The pump of Claim 63 wherein the activator is designed to activate individual actuators at a time and sequence selected to displace the ~~fluid~~liquid at the chosen rate.

Claim 4 (cancelled)

Claim 5 (previously presented): The pump of Claim 59 wherein the controller is a programmable microprocessor in electrical connection with the activator.

Claim 6 (currently amended): The pump of Claim 59 comprising in addition a sensor for determining physical properties of the ~~fluid~~liquid wherein the sensor is in electrical connection with the controller and is capable of delivering signals received from the ~~fluid~~liquid to the controller.

Claim 7 (previously presented): The pump of Claim 6 wherein the physical properties to be sensed are selected from the group consisting of chemical composition, pH, pressure, temperature and flow rate.

Claim 8 (withdrawn): A pump for moving a fluid in a determined path comprising the pump of Claim 1 wherein the positions of the actuators in the actuator housing are selected to define the flow path for the liquid when displaced.

HAYES SOLOWAY P.C.
3450 E. SUNRISE DRIVE, SUITE 140
TUCSON, AZ 85718
TEL. 520.882.7623
FAX. 520.882.7643

175 CANAL STREET
MANCHESTER, NH 03101
TEL. 603.668.1400
FAX. 603.668.8567

Claim 9 (withdrawn): The pump of Claim 8 wherein the actuator housing comprises more than one inlet port each port being capable of receiving an individual fluid and wherein individual flow paths are determined for each fluid.

Claim 10 (withdrawn): The pump of Claim 8 comprising two or more outlet ports.

Claim 11 (withdrawn): The pump of Claim 9 wherein the flow paths of individual liquids are allowed to intersect and thereby allow mixing of the displaced fluids.

Claim 12 (withdrawn): A pump for moving a fluid at a determined rate and in a determined path comprising the pump of Claim 1 wherein said actuator sequentially activates individual contiguous actuators at a selected time and the actuators are located on one or more walls of the inner cavity at positions selected to define a flow path for the displaced liquid when the actuators are activated.

Claim 13 (withdrawn): The pump of Claim 1 wherein the actuator housing is located inside a chamber containing the fluid, the chamber being a component of an on-line fluid processing system and the inlet port and outlet ports of the actuator housing are on the axis of flow in the fluid processing system.

Claim 14 (withdrawn): The pump of Claim 1 comprising in addition a connector for coupling the actuator housing into an on-line processing system.

Claim 15 (currently amended): The pump of Claim 63 wherein at least one of said actuators is positioned near the inlet port of the actuator housing and, when activated, forms a barrier preventing backflow of ~~fluid~~liquid from the actuator housing.

Claim 16 (withdrawn): The pump of Claim 1 comprising in addition an elastomeric impermeable lining located between the actuators and the housed fluid to prevent contact of the actuators and the fluid.

HAYES SOLOWAY P.C.
3450 E. SUNRISE DRIVE, SUITE 140
TUCSON, AZ 85718
TEL. 520.882.7623
FAX. 520.882.7643

175 CANAL STREET
MANCHESTER, NH 03101
TEL. 603.668.1400
FAX. 603.668.8567

Claim 17 (currently amended): The pump of Claim 63 wherein the actuators are essentially inert and non-reactive with the ~~fluid~~liquid.

Claim 18 (withdrawn): The pump of Claim 16 wherein the actuators are biocompatible.

Claim 19 (previously presented): The pump of Claim 63 wherein individual actuators are each encased in an essentially inert material.

Claim 20 (previously presented): The pump of Claim 19 wherein the material is semi-permeable to electrolytes.

Claim 21 (original): The pump of Claim 17 wherein the material is non-permeable.

Claims 22 - 23 (cancelled)

Claim 24 (previously presented): The pump of Claim 63, wherein each actuator is electrically shielded from contiguous actuators.

Claim 25 (previously presented): The pump of Claim 24, comprising an electrical circuit for activating individual actuators at a determined time.

Claim 26 (previously presented): The pump of Claim 25 comprising in addition a microprocessor in electrical contact with the electrical circuit, the microprocessor being programmed to drive the electrical circuit at a determined time whereby individual actuators are activated at a determined time and sequence.

Claim 27 (withdrawn): The pump of Claim 1 wherein the actuators comprise electroactive gels that are activated by contact with electrolyte.

Claim 28 (withdrawn): The pump of Claim 27 comprising a reservoir for housing an electrolytic solution.

Claim 29 (withdrawn): The pump of Claim 28 comprising a permeable frit between the actuator and the electrolytic solution.

HAYES SOLOWAY P.C.
3450 E. SUNRISE DRIVE, SUITE 140
TUCSON, AZ 85718
TEL. 520.882.7623
FAX. 520.882.7643

175 CANAL STREET
MANCHESTER, NH 03101
TEL. 603.668.1400
FAX. 603.668.8567

Claim 30 (withdrawn): The pump of Claim 1 wherein the actuators are polymer gels activated by contact with an electrolytic solution, individual polymers are each encased with a semi-permeable material, the actuator housing comprises a reservoir for housing electrolytic solution and a frit located between the reservoir and the actuator and the activator means is an electrical circuit whereby electrolytic solution is caused to flow through the frit and semi-permeable material from the reservoir into contact with the polymer and away from the polymer to cause reversible dimension change of the actuator.

Claim 31 (withdrawn): The pump of Claim 30 wherein the electrical circuit is operated by a remote control device.

Claim 32 (withdrawn): The pump of Claim 31 wherein the remote control device is infra-red or radio-frequency driven.

Claim 33 (withdrawn): The pump of Claim 31 wherein the remote control device comprises a microprocessor programmed to activate the actuators at a selected time and sequence.

Claim 34 (withdrawn): The pump of Claim 1 wherein the actuators comprise optically responsive polymers.

Claim 35 (withdrawn): The pump of Claim 34 wherein the optically responsive polymers are ionized in the presence of light.

Claim 36 (withdrawn): The pump of Claim 34 wherein the optically responsive polymers change pH in the presence of light.

Claim 37 (withdrawn): The pump of Claim 36 wherein the polymers comprise anthracene.

HAYES SOLOWAY P.C.
3450 E. SUNRISE DRIVE, SUITE 140
TUCSON, AZ 85718
TEL. 520.882.7623
FAX. 520.882.7643

175 CANAL STREET
MANCHESTER, NH 03101
TEL. 603.668.1400
FAX. 603.668.8567

Claim 38 (withdrawn): The pump of Claim 34 wherein the activation of the optically active polymers is controlled by exposure to a laser beam of specific wavelength, natural light, a LED or a quantum light source.

Claim 39 (withdrawn): The pump of Claim 38 wherein the time of light exposure is controlled by a remote control device.

Claim 40 (withdrawn): The pump of Claim 39 wherein the remote control device is infra-red or radio-frequency driven.

Claim 41 (withdrawn): The pump of Claim 34 wherein the control device is driven by a microprocessor. programmed to activate the actuators at a selected time and sequence.

Claim 42 (withdrawn): The pump of Claim 1 wherein the actuators comprise electroactive polymers that a directly activated by signal from an electrical circuit.

Claim 43 (withdrawn): The pump of Claim 1 wherein the actuators comprise a chemically activated polymer.

Claim 44 (withdrawn): The pump of Claim 1 wherein the actuators comprise a magnetically active polymer.

Claim 45 (withdrawn): The pump of Claim 1 wherein the actuators comprise a thermally active polymer.

Claim 46 (withdrawn): The pump of Claim 1 wherein the actuators comprise shape memory alloys.

Claim 47 (withdrawn): The pump of Claim 1 wherein the actuators comprise ceramic piezoelectric actuator.

Claim 48 (withdrawn): The pump of Claim 1 wherein the actuators comprise polymer/ceramic piezoelectric combinations.

Claim 49 (withdrawn): The pump of Claim 11 as a fluid mixing device.

HAYES SOLOWAY P.C.
3450 E. SUNRISE DRIVE, SUITE 140
TUCSON, AZ 85718
TEL. 520.882.7623
FAX. 520.882.7643

175 CANAL STREET
MANCHESTER, NH 03101
TEL. 603.668.1400
FAX. 603.668.8567

Claim 50 (withdrawn): A pump for propelling an object along a surface comprising:

a. an actuator housing in contact with the object;

b. a plurality of contiguous actuators in contact with the actuator housing and in contact with the surface; and

c. an activator for sequentially activating individual actuators, wherein each actuator, when activated, changes dimensions and exerts a displacing force on the surface and thereby propels the solid object in a direction opposite that of the displacing force.

Claim 51 (withdrawn): The pump of Claim 50 for propelling an object suspended on a liquid surface.

Claim 52 (withdrawn): The pump of Claim 50 for propelling an object suspended on a solid surface.

Claim 53 (withdrawn): The pump of Claim 50 for propelling an object submerged in a liquid.

Claim 54 (withdrawn): A method of pumping a fluid at a controlled rate comprising placing the actuator housing of Claim 1 into fluid contact with the fluid, activating a first actuator to prevent back-flow from the actuator housing and then repeatedly activating the contiguous actuators at a sequence wherein activation of one of the individual actuators occurs at a time after one of its contiguous actuators has been activated.

Claim 55 (withdrawn): The method of Claim 54 for pumping fluids of different viscosities wherein the pump comprises two or more actuator housings in fluid connection and each actuator housing is operated at a different flow rate.

Claim 56 (withdrawn): The pump of Claim 1 as an implantable infusion pump.

Claim 57 (withdrawn): The pump of Claim 1 as a drug delivery device for delivering a liquid drug or drug solution at a controlled rate and at a controlled time to an individual

HAYES SOLOWAY P.C.
3450 E. SUNRISE DRIVE,
SUITE 140
TUCSON, AZ 85718
TEL. 520.882.7623
FAX. 520.882.7643

175 CANAL STREET
MANCHESTER, NH 03101
TEL. 603.668.1400
FAX. 603.668.8567

wherein the actuator housing comprises a single outlet port but no inlet port and houses the liquid drug or drug solution to be delivered.

Claim 58 (currently amended): A pump for delivering a ~~fluid~~liquid containing a medicament, liquid drug, or drug solution to a human or animal patient, comprising:

a. an actuator housing having a chamber [[for]] housing the ~~fluid~~ liquid, the chamber having an inner surface and an outlet port for accommodating ~~fluid~~liquid flow through the chamber;

b. a plurality of individual actuators arranged contiguously in a series and located in the chamber opposite to the inner surface and in contact with the ~~fluid~~liquid, wherein successive actuators in the series are sequentially expanded from the starting position toward the inner surface of the chamber to advance the flow of ~~fluid~~liquid through the chamber and out the outlet port; and

c. an activator for sequentially activating individual actuators, wherein each actuator comprises a reversibly responsive elastomeric material.

Claim 59 (previously presented): A pump of Claim 63 comprising in addition a controller for the actuator whereby individual actuators are activated at a determined time.

Claim 60 (previously presented): The pump of Claim 63 wherein the reversibly responsive elastomeric material is selected from the group consisting of an electroactive polymer, an electrolytically activated polymer gel, an optically activated polymer, a piezoelectric polymer, a piezoelectric ceramic material, a chemically activated polymer, a magnetically activated polymer, a magnetically activated polymer and a shape memory polymer.

Claim 61 (previously presented): The pump of Claim 63 wherein the actuators comprise an electroactive polymer.

HAYES SOLOWAY P.C.
3450 E. SUNRISE DRIVE, SUITE 140
TUCSON, AZ 85718
TEL. 520.882.7623
FAX. 520.882.7643

175 CANAL STREET
MANCHESTER, NH 03101
TEL. 603.668.1400
FAX. 603.668.8567

Claim 62 (cancelled).

Claim 63 (currently amended): A pump for moving a ~~fluid~~ liquid, comprising:

a. an actuator housing having a chamber [[for]] housing the ~~fluid~~liquid, the chamber having an inner surface and an outlet port for accommodating ~~fluid~~liquid flow through the chamber;

b. a plurality of individual actuators comprising a reversibly responsive elastomeric material, wherein the plurality of individual actuators [[is]]are arranged in a series and located in the chamber opposite to the inner surface and in contact with the ~~fluid~~liquid, wherein each actuator is separated from the inner surface of the chamber, and wherein successive actuators in the series are sequentially expanded from the starting position toward the inner surface of the chamber to advance the flow of ~~fluid~~liquid through the chamber and out the outlet port; and

c. an activator for sequentially controlling individual actuators.

Claim 64 (currently amended): The pump of Claim 58 wherein the actuator housing comprises two or more chambers for housing the ~~fluid~~liquid in flow connection.

Claim 65 (currently amended): The pump of Claim 58 wherein the activator is designed to activate individual actuators at a time and sequence selected to displace the ~~fluid~~liquid at the chosen rate.

Claim 66 (previously presented): A pump of Claim 58 comprising in addition a controller for the actuator whereby individual actuators are activated at a determined time.

Claim 67 (previously presented): The pump of Claim 66 wherein the controller is a programmable microprocessor in electrical connection with the activator.

Claim 68 (currently amended): The pump of Claim 66 comprising in addition a sensor for determining physical properties of the fluid wherein the sensor is in electrical connection with the controller and is capable of delivering signals received from the ~~fluid~~liquid to the controller.

HAYES SOLOWAY P.C.
3450 E. SUNRISE DRIVE, SUITE 140
TUCSON, AZ 85718
TEL. 520.882.7623
FAX. 520.882.7643

175 CANAL STREET
MANCHESTER, NH 03101
TEL. 603.668.1400
FAX. 603.668.8567

Claim 69 (previously presented): The pump of Claim 68 wherein the physical properties to be sensed are selected from the group consisting of chemical composition, pH, pressure, temperature and flow rate.

Claim 70 (currently amended): The pump of Claim 58 wherein the actuators are essentially inert and non-reactive with the ~~fluid~~liquid.

Claim 71 (previously presented): The pump of Claim 58 wherein individual actuators are each encased in an essentially inert material.

Claim 72 (previously presented): The pump of Claim 71 wherein the material is semi-permeable to electrolytes.

Claim 73 (previously presented): The pump of Claim 70 wherein the material is non-permeable.

Claim 74 (previously presented): The pump of Claim 58, wherein each actuator is electrically shielded from contiguous actuators.

Claim 75 (previously presented): The pump of Claim 74, comprising an electrical circuit for activating individual actuators at a determined time.

Claim 76 (previously presented): The pump of Claim 25 comprising in addition a microprocessor in electrical contact with the electrical circuit, the microprocessor being programmed to drive the electrical circuit at a determined time whereby individual actuators are activated at a determined time and sequence.

Claim 77 (previously presented): The pump of Claim 58 wherein the reversibly responsive elastomeric material is selected from the group consisting of an electroactive polymer, an electrolytically activated polymer gel, an optically activated polymer, a piezoelectric polymer, a piezoelectric ceramic material, a chemically activated polymer, a magnetically activated polymer, a magnetically activated polymer and a shape memory polymer.

HAYES SOLOWAY P.C.
3450 E. SUNRISE DRIVE,
SUITE 140
TUCSON, AZ 85718
TEL. 520.882.7623
FAX. 520.882.7643

175 CANAL STREET
MANCHESTER, NH 03101
TEL. 603.668.1400
FAX. 603.668.8567

Claim 78 (previously presented): The pump of Claim 58 wherein the actuators comprise an electroactive polymer.

HAYES SOLOWAY P.C.
3450 E. SUNRISE DRIVE,
SUITE 140
TUCSON, AZ 85718
TEL. 520.882.7623
FAX. 520.882.7643

175 CANAL STREET
MANCHESTER, NH 03101
TEL. 603.668.1400
FAX. 603.668.8567